Iowa Department of Natural Resources
Environmental Services Division
Air Quality Bureau

Air Dispersion Modeling Guidelines

For PSD Projects

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A. Modeling Protocol Template (DOC File)
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Overview

This document gives a general background of the modeling and additional impact requirements associated with a PSD air quality assessment. Since every PSD project is unique, it is impossible to address the varied details of every modeling analysis. This section should only be used as a guideline for conducting an air quality analysis; applicants are responsible for accomplishing the analysis according to requirements set forth under 40 CFR 52.21.

Additional information can be found in 40 CFR Part 52.21, 40 CFR Part 51, Appendix W, EPA's draft "New Source Review Workshop Manual" October 1990, EPA's "Workbook for Plume Visual Screening and Analysis (Revised)" October 1992 (EPA-454/R-92-023), and EPA's website for the Technology Transfer Network (TTN) Support Center for Regulatory Air Models (SCRAM) at the following address:

http://www.epa.gov/ttn/scram/

All PSD permits require an air quality analysis of the ambient impacts associated with the project. This analysis includes an assessment of existing air quality, an air dispersion modeling analysis, an additional impact analysis, and an evaluation of any adverse impacts to Class I areas. The assessment of existing air quality (pre-construction monitoring) is addressed in the "PSD Guidance Document" at:

www.iowacleanair.com/prof/const/files/psd_guidance.pdf

The air dispersion modeling analysis is required to demonstrate that new emissions from the source or major modification, in conjunction with applicable emissions from other existing sources, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS) or PSD increment. The analysis involves two distinct phases: a preliminary analysis and a full impact analysis. The preliminary analysis evaluates potential emissions from the project alone. The results of the preliminary analysis determine whether or not a full impact analysis is required. In addition to emissions from the project, the full impact analysis also considers emissions from existing sources and growth associated with the new project. For PM_{10}, SO_2, and NO_2, the full impact analysis consists of separate modeling analyses for the NAAQS and the PSD increments.

The Iowa DNR may require a NAAQS modeling analysis for non-PSD significant pollutants, especially in areas of NAAQS concern. Since there are known areas with existing ambient concentrations close to the NAAQS for some pollutants, projects that emit these pollutants may need to be evaluated even if these pollutants are proposed to be emitted in amounts less than the PSD significant emission rates. This modeling can be conducted according to the non-PSD modeling guidelines.

The additional impact analysis must be conducted for all PSD projects. This analysis assesses the impact of the emissions from the project and any associated growth on soils, vegetation, and visibility. Although there are currently no Class I areas located in Iowa or within 100 kilometers of the borders, a Class I visibility analysis also must be conducted.

The Modeling Protocol

Because air dispersion modeling is a complicated process, the DNR requires that all PSD applicants submit a detailed modeling protocol prior to attending the pre-application meeting. By doing so, the DNR can communicate to the applicant the acceptability of the proposed analysis prior to conducting any extensive modeling analyses, hopefully decreasing the chance of errors or inadvertent exclusion of required information. Changes to the protocol may be required as the analysis progresses; however the protocol establishes a common understanding of the requirements.

A template for developing a modeling protocol is in Attachment A and can be found at the following address:

http://www.iowacleanair.com/prof/progdev/files/protocol_template.doc

The template lists each topic that should be discussed in the modeling protocol. After the modeling protocol is submitted, the DNR modeling group will review it and provide comments during the pre-application meeting.

Volatile Organic Compound (VOC) Emissions

For proposed projects with a net increase of greater than 100 tons per year of VOC emissions, the potential effects on ambient ozone concentrations must be evaluated. The DNR recommends estimating the ozone increase by using a conservative screening methodology based on the "*VOC/NOX Point Source Screening Tables*" developed by Scheffe (EPA-OAQPS-TSD-SRAB, 1988). This conservative methodology is used to identify estimated incremental ozone plumes from individual sources that potentially exceed a threshold of 0.012 parts per million on an hourly basis. For sources that do exceed the 0.012 part per million threshold, refined incremental ozone plume analysis through full application of the Reactive Plume Model is required.

Two calculations are required to use the screening tables. The VOC/NOX ratio is calculated as the proposed annual VOC emissions divided by the proposed annual NOX emissions and is used with the X-axis NMOC/NOX tons per year values in the lookup tables. The annual VOC emissions are calculated as the maximum daily VOC emission rate multiplied by 365 for use with the Y-axis NMOC (tons per year) values in the lookup table.

There are two separate lookup tables, one for rural and one for urban areas. The rural or urban determination is based on different criteria than that used for the dispersion coefficient discussed under Model Selection and Options. If the source location and downwind impact area are rural and there has never been a reported ozone exceedance, use the rural table. If the source location and downwind area can be characterized as urban, use the urban table. When the choice of tables is not obvious, use both tables and determine the highest value.

To support application of this analysis, the screening tables provided in the EPA document have been expanded and are located in Attachment B at:

http://www.iowacleanair.com/prof/progdev/files/scheffe_table.xls

The estimated incremental ozone plume is determined by the intersection of the X and Y-axis. Incremental ozone plumes that potentially exceed the 1-hour ozone threshold are color coded in red. Provided that the screening technique indicates incremental ozone plume values less than 10% of the ozone standard (0.012 parts per million for the 1-hour ozone NAAQS), refined modeling with the Reactive Plume Model is not required.

Application of this analysis for protection of the 8-hr ozone NAAQS is dependent on the details of implementation of that revised standard. Until the necessary implementation details are available, and appropriate application of this analysis for 8-hr ozone is approved by EPA Region VII, this analysis protocol should only be used for current requirements concerning the 1-hour ozone NAAQS.

Model Selection and Options

The latest version of the Industrial Source Complex Short-Term (ISCST) model is preferred for conducting the dispersion modeling analysis. The Industrial Source Complex Short-Term with Plume Rise Model Enhancements (ISC-PRIME) and the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) are alternative models that maybe used for the PSD modeling analysis with prior DNR approval.

The regulatory default options should be used in the modeling analysis. These include use of stack-tip downwash (except for Schulman-Scire downwash), use of buoyancy induced dispersion (except for Schulman-Scire downwash), use of the calms processing routines, use of upper-bound concentration estimates for sources influenced by building downwash from super-squat buildings, use of default wind profile exponents, and use of default vertical potential temperature gradients. Do not use gradual plume rise (except with building downwash). The models listed above use these options unless specified otherwise.

At this time, the rural dispersion coefficient should be selected for all locations in Iowa.

Source Information

Indoor Venting Emission Units
Indoor venting units must be included in the modeling analysis as a volume source or series of volume sources. The DNR has developed a spreadsheet that can be used to automatically determine the parameters to use for such sources. To obtain this spreadsheet, contact a member of the DNR modeling group at 515-242-5100.

Fugitive Sources
Fugitive sources such as storage piles, transfer points and unpaved roads must be included in the modeling analysis.

Cooling Towers
PM-10 emissions from cooling towers must be included in the PSD modeling analysis. Cooling towers should be modeled as a series of point sources, one for each cooling cell.

Ancillary Sources
Ancillary sources include fire pumps, emergency generators, black start generators, and any other source that will only be operated when the rest of the facility is not (except for test and maintenance purposes). Ancillary sources must be evaluated as part of the PSD NAAQS evaluation; however they may be modeled in a separate analysis. All ancillary sources should be modeled to assure compliance with all applicable (short-term) NAAQS.

Operational Loads
If a source(s) will be operated continuously at reduced loads (50 percent, 75 percent, etc.) then screening modeling should be performed to determine which operating load produces the worse-case predicted impacts for each applicable averaging period. Additional information on this requirement can be found in Section 9.1 of Appendix W of 40 CFR Part 51. If a source(s) will operate at greater than design capacity for periods that could result in violations of the NAAQS, this load should be modeled. In either case, the load causing the highest predicted concentration, in addition to the design load, should be modeled.

Alternatively, the worse-case stack parameters (lowest temperature and exit velocity, and highest emission rate) from each of the operational loads for each source may be modeled simultaneously to produce a conservative prediction. If the conservative approach results in model concentrations that are less than the applicable standards, then a more refined method is not necessary. This approach can significantly reduce the time it takes to conduct the analysis, as well as the time it takes for the DNR review.

Operating Restrictions
To incorporate operating restrictions in the modeling analysis, the following methodologies should be used:

1. Annual Hourly Operating Restrictions:

If annual hourly limitations are to be implemented without regard to season or month, the number of hours used should be divided by 730 hours and the result rounded to the nearest integer. Monthly averaging periods will then be modeled and the predicted concentrations from the highest months will be averaged. The number of months to include in the average is given by the integer from the previous calculation. The average predicted concentration is then multiplied by the number of hours of operation to which the emission unit will be limited and divided by 8760 hours. The result is the annual average and should be performed for each of the five years. If the number of hours to which the emission unit is to be limited is less than 365, the same procedure should be used replacing 730 hours with 24 hours and using the highest 24-hr averages rather than monthly averages.

2. Daily Hourly Operating Restrictions:
   If daily hourly operating restrictions are to be implemented without regard to specific times of day, the emission unit(s) should be modeled with an averaging period that corresponds to the number of hours requested as the daily operating hour restriction. The impacts from this averaging period are then multiplied by the requested hours of operation and divided by 24 hours per day. The calculated impacts from the emission unit(s) with the daily operating restriction should be added to the impacts from the rest of the facility for each year of the modeling analysis. For situations where the emission unit(s) are limited to a period of operation other than the averaging periods available in the model, or for additional information on modeling restricted hours of operation, please refer to the "Suggested DNR Methodology for Modeling Facilities Requesting Restricted Daily Operating Hours," available at the following address:

   www.iowacleanair.com/prof/tech/tech.html

Building Downwash
A building downwash analysis shall be conducted using the most recent version of EPA's Building Profile Input Program (BPIP). Off-property buildings that affect downwash must also be included in this analysis.

Receptor Information

Ambient Air
Ambient air is defined in 567 IAC 20.2 as "that portion of the atmosphere, external to buildings, to which the general public has access. Ambient air does not include the atmosphere over land owned or controlled by the source and to which public access is precluded by a fence or other physical barriers." For PSD modeling, receptors only need to be placed in ambient air locations.

Receptor Spacing Requirements
At a minimum, receptors should include a Cartesian grid with receptors spaced as follows:

- 50 m along the facility fence line
- 50 m extending from the fence line to 0.5 km
- 100 m extending from 0.5 km to 1.5 km
- 250 m extending from 1.5 km to 3 km
- 500 m extending from 3 km to 5 km

Additional receptors, spaced at 1000 meters, may be necessary beyond 5 km from the source. Concentrations should clearly be decreasing near the edge of the receptor grid. If not, additional receptors should be added. Fine grids (50 m) should be placed over the area(s) of maximum concentration to ensure that the true maximum concentration is identified.

Meteorological Data

The DNR currently maintains five year data sets for 10 National Weather Service (NWS) station locations for the period 1987 through 1991. Applicants can obtain meteorological data in an ASCII format suitable for use in the ISCST model at:

www.iowacleanair.com/prof/tech/ISCMetData.html

The Iowa map on the website depicts which surface and upper air station meteorological data are considered representative of each county in the state. Simply click on a region of the state to download the latest pre-processed and approved meteorological data for use in the ISCST3 air dispersion model. The preprocessed meteorological data can also be acquired by contacting the DNR modeling group at 515 242-5100.

The correct anemometer height for each meteorological data set is listed in Table 1 below. The meteorological data sets are named by the applicable surface station name.

Table 1: Anemometer Height for each NWS Meteorological Data Set, 1987-1991

Surface Station Name	**Surface Station ID**	**Upper Air Station Name**	**Upper Air Station ID**	**Anemometer Height** (ft)/(m)
Burlington, IA	14931	Peoria, IL	14842	20 / 6.096
Cedar Rapids, IA	14990	Peoria, IL	14842	20 / 6.096
Des Moines, IA	14933	N. Omaha, NE	94918	20 / 6.096
La Cross, WI	14920	St Cloud, MN	14926	21 / 6.401
Mason City, IA	14940	N. Omaha, NE	94918	20 / 6.096
Moline, IL	14923	Peoria, IL	14842	25 / 7.620 *
Omaha, NE	14942	N. Omaha, NE	94918	20 / 6.096
Sioux City, IA	14943	N. Omaha, NE	94918	28 / 8.534
Sioux Falls, SD	14944	N. Omaha, NE	94918	30 / 9.144
Waterloo, IA	94910	Peoria, IL	14842	20 / 6.096

* The anemometer height for the year 1991 equals 30 feet (9.144 meters).

The use of non-NWS meteorological data sets, or combinations of surface and upper air data different from those specified in the table, is not permissible without prior approval of the DNR modeling group. For meteorological data to be used with AERMOD, please contact the modeling group.

Determination of Impact on Air Quality

Preliminary Modeling Analysis

The preliminary analysis evaluates potential emissions from the PSD project alone. The results of the preliminary analysis determine whether or not a full impact analysis is required. Provided that predicted concentrations from the project are below the applicable Modeling Significance Levels (MSLs), a full impact analysis is not required. A table of the MSLs are listed in Table 2 below:

Table 2: Modeling Significance Levels

Pollutant	**Averaging Period**	**Modeling Significance Level** ($\mu g/m^3$)
PM_{10}	Annual	1
	24-hour	5
SO_2	Annual	1
	24-hour	5
	3-hour	25
NO_X	Annual	1
CO	8-hour	500
	1-hour	2,000

Full Impact Analysis

If any of the modeled concentrations from the preliminary modeling analysis equal or exceed the MSLs, then a full impact analysis must be conducted. The preliminary analysis should be used to determine the Significant Impact Area (SIA).

The SIA is a circular area with a radius that extends from the source to the most distant point where the modeling predicts concentrations equal to the MSL, or 50 kilometers, whichever is less. The SIA is determined for each averaging period for each pollutant with predicted concentrations equal to or greater than the MSLs. The SIA used for the full impact analysis for a pollutant with more than one averaging period is the largest of the SIAs determined for that pollutant.

Source and Modeling Inventories

In addition to emissions from the project, the full impact analysis also considers emissions from existing sources and also the growth associated with the new project. The existing sources to consider for inclusion in the full impact analysis are all sources within the SIA or in the annular area extending 50 kilometers beyond the SIA (known as the screening area).

Once the extent of the SIA is determined, the DNR should be contacted. The DNR will provide a list of Iowa facilities to include in the source inventory for the pollutant(s) of concern. All facilities that are major (Title V) for the pollutant(s) of concern, that are located within the SIA, will be included in the source inventory. Facilities that have (or have applied for) Voluntary Operating Permits and facilities that have actual emissions that are 50% or less of the major source thresholds for regulated pollutants will be included if they are deemed to be near the facility being evaluated.

The applicant is responsible for developing a modeling inventory from the source inventory provided by the DNR. Since the full impact analysis consists of separate modeling analyses for the NAAQS and the PSD increments, two separate modeling inventories may need to be developed. The modeling inventory will include the emission units, emission rates, and stack parameters for each source included in the modeling analysis. The Construction Permit Application Form MI-2 should be used for the emission units at the facility associated with the PSD project. The modeling inventories of other sources to be included in the NAAQS and PSD increment analyses can be provided on the Form MI-2 (or equivalent) to document the applicable inventory information.

Information required to develop the modeling inventory is available in the Air Quality Bureau's Records Section, which is open Monday through Friday from 8:00 AM to 4:30 PM. Contact the records section at (515) 242-5100 to obtain information on records procedures and photocopying costs. DNR will provide ISCST3 input files for facilities and pollutants that have been previously modeled, as available.

If the SIA or the screening areas extend into surrounding states, the appropriate agency should be contacted to obtain the appropriate NAAQS emissions inventory for those states.

NAAQS Modeling

Compliance with the NAAQS is based on the total ambient impact from the sources included in the modeling analysis and the measured background levels. The NAAQS are listed in Table 3 on the next page.

All sources included in the NAAQS analysis must be modeled at the maximum allowable emission rates. Actual hours of operation per year can be used when modeling for the annual or quarterly averaging periods (see operating restrictions described above). The hours of operation are determined from the actual hours of operation averaged over the past two years. Unless there is a federally enforceable permit restriction on the number of hours per day, sources should be assumed to operate continuously for the short-term averaging periods.

Table 3: National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	National Ambient Air Quality Standards ($\mu g/m^3$)
NO_2	Annual	100[a]
SO_2	3-hr	1,300[b]
	24-hr	365[b]
	Annual	80[a]
PM_{10}	24-hr	150[c]
	Annual	50[d]
CO	1-hr	40,000[b]
	8-hr	10,000[b]
Pb	Calendar quarter	1.5[a]

[a] Never to be exceeded
[b] Not to be exceeded more than once per year
[c] Standard is attained when the expected number of exceedances is less than or equal to 1
[d] Standard is attained when the expected annual arithmetic mean is less than or equal to $50 \mu g/m^3$

The appropriate background values must be added to modeled concentrations before compliance with the NAAQS can be determined. Current statewide default background values are listed in Table 4 below:

Table 4: Statewide Default Background Values

Pollutant	Averaging Period	Background Concentration Value ($\mu g/m^3$)
NO_2	Annual	14
SO_2	All	20
PM_{10}	24-hour	52
	Annual	26
CO	1-hour	0
	8-hour	0
Pb	Calendar Quarter	0

Applicants may use local monitoring data, if available, instead of the statewide default background values, to determine more refined estimates of background values. Acceptable methods for determining refined estimates of background values from local monitoring data include 40 CFR Part 51, Appendix W or background concentrations based on monitoring data from locations with similar land use. If refined values are used, provide a detailed explanation in the modeling report of how the background value(s) were derived, the data considered, and the resulting values used for department review and approval.

PSD Increment Modeling

The PSD increments are the maximum allowable increase in concentration of a pollutant that can occur above the applicable baseline concentration. The baseline concentration is the ambient concentration of a pollutant existing at the time that the first complete PSD

permit application affecting the area was submitted. All of Iowa is considered to be a Class II area. The Class II PSD increments are listed in Table 5 below:

Table 5: PSD Increments

Pollutant	Averaging Period	PSD Increment (Class II) ($\mu g/m^3$)
PM_{10}	Annual	17
	24-hour	30
SO_2	Annual	20
	24-hour	91
	3-hour	512
NO_2	Annual	25

The emissions to be included in the increment analysis are the actual emissions increases (or decreases) after the Major Source Baseline Date that are associated with construction at a major source, and, the actual emissions increases (or decreases) at any stationary source after the Minor Source Baseline Date. The baseline dates for Iowa are listed in Table 6 below:

Table 6: Baseline Dates for Iowa

Pollutant	Major Source Baseline Date	Minor Source Baseline Date
PM-10	January 6, 1975	Varies by location*
SO2	January 6, 1975	September 6, 1978
NO2	February 8,1988	March 14, 1988

* The Minor Source Baseline Date for PM-10 varies by location in the state of Iowa, and has yet to be triggered in some locations. Please contact the modeling group for the PM-10 Minor Source Baseline Dates for a particular area.

For short-term averaging periods, the difference between the current maximum actual emissions and the maximum actual emissions as of the applicable baseline date is modeled. The maximum actual emissions are considered to be the highest occurrence for that averaging period during the previous two years of operation. For the annual averaging period the difference between the current average actual emissions and the average actual emissions as of the applicable baseline date are modeled. In both cases the average actual emissions are calculated as the average over the previous two year period.

Many facilities do not have the necessary records to support the calculation of the change in actual emissions since the applicable baseline date. Therefore, as a conservative approach, the DNR recommends that the first level of the increment analysis be accomplished using the actual emissions from the previous two years for all emission sources included in the analysis. If this approach results in predicted concentrations above the applicable PSD increment, then the difference in actual emissions can be determined for the emission unit(s) contributing to the exceedances and the model rerun.

This approach eliminates the need to calculate the difference in actual emissions for all increment consuming sources.
If the change in actual emissions included a change in stack parameters, then the stack parameters and emission rates associated with both the baseline case and the current cases are input into the same model run, with the baseline case modeled as negative emissions and the current case modeled as positive emissions, each with the appropriate stack parameters.

Additional guidance related to the calculation of emission rates for PSD increment modeling can be found in the EPA's draft "New Source Review Workshop Manual," October 1992.

NO_X Ratio Method
Generally, the initial NO_2 modeling conducted for the preliminary analysis and the full impact analysis assume a total conversion from NO to NO_2. If the modeling predicts exceedances of the MSL, NAAQS, or PSD increment for NO_2, the NO_X ratio method can be applied. The NO_X ratio method is calculated by multiplying the predicted NO_X concentrations by the national default NO_2/ NO_X value of 0.75 to determine the predicted concentrations of NO_2. Refer to Appendix W of 40 CFR Part 51 for using an NO_2/ NO_X value other than the default value.

Additional Impact Analysis

A Class II additional impact analysis must be conducted for all PSD projects. The purpose of this analysis is to make the public aware of what impacts the proposed project will have on residential, commercial, and industrial growth in the area, and on soils, vegetation and visibility in the vicinity of the proposed project location. Therefore, data from the additional impacts analysis must be presented so that it is logical and understandable to the interested public.

Growth Analysis
This analysis is an estimate of the projected residential, commercial, and industrial growth that will occur as a result of the PSD project and an estimate of the air emissions associated with this growth. Air emissions associated with any new growth predicted to result from the proposed project and the air emissions from the proposed PSD project are modeled together. The applicable background values are added to the resulting modeled concentrations and the results compared with the applicable NAAQS and PSD increments.

Often the new residential, commercial, and industrial growth estimated to occur as a result of the PSD project is negligible. In this case, further modeling analyses for growth is not necessary.

Soils and Vegetation Analysis
This analysis must be conducted for all PSD projects. Based on guidance from EPA Region VII, stating that predicted concentrations from the modeling analyses are below the MSLs or the NAAQS is not adequate.

The soils and vegetation analysis is based on an inventory of the soils and vegetation types found in the area. The inventory of vegetation should include all vegetation with any commercial or recreational value. Once an inventory of soils and vegetation has been completed, a literature search is conducted to determine the sensitivity of these soils and vegetation to each of the applicable pollutants that will be emitted in significant amounts. This information should be compared to the predicted concentrations determined from the modeling analyses.

Potentially sensitive vegetation species (such as soybeans) may require a more careful examination. Some species may be harmed by long-term exposure to low concentrations of pollutants. The analysis should evaluate predicted concentrations for the averaging periods associated with the averaging periods addressed in the applicable vegetation impact studies. Since multiple pollutants may impact soils and vegetation synergistically, the combined impacts of NO_X and SO_2 (if applicable) should be evaluated. One reference for information on the relative sensitivities of plants to NO2 is Table 9-6 of EPA's "Air Quality Criteria for Oxides of Nitrogen, Summary of Vegetation Impacts" Volume II, August 1993 (EPA 600/8-91/049bF). This document has been included in Attachment C at the following address:

http://www.iowacleanair.com/prof/progdev/files/nox_veg_impacts.pdf

Visibility Analysis
The applicant shall perform a visibility analysis to determine the impacts that the PSD project will have on sensitive areas such as state parks, wilderness areas, airports, scenic sites and overlooks. The DNR should be consulted prior to completing the visibility analysis to ensure that acceptable sensitive areas are considered.

The visibility analysis shall be conducted according to EPA's "Workbook for Plume Visual Screening and Analysis (Revised)" October 1992 (EPA-454/R-92-023). This analysis is normally completed using the EPA's VISCREEN model. The VISCREEN model output should be included in the analysis submitted to the DNR.

Possible impairments to visibility on off-site roads adjacent to a facility due to the condensation of plumes will be considered on a case-by-case basis. Sources of condensation plumes that could impair visibility include, but are not limited to, cooling towers and scrubber exhausts.

Level-1 Screening Analysis
The Level-1 screening analysis conducted with the VISCREEN model is conservative and relatively simple to run. The required inputs for performing the analysis are emission rates, distances, and the background visual range.

The total emissions of PM (including soot and primary sulfate) and NO_X (including primary NO_2) are calculated based on the maximum short-term emission rates. The required distances are: 1) the distance between the source and the area being observed and 2) the distance between the source and the observer location. These two distances may or may not be the same. The background visual range for Iowa is 40 kilometers. From these inputs the VISCREEN model calculates visibility variables that can be compared to the standardized screening values.

Level-2 Screening Analysis
If the predicted visibility variables determined in the Level-1 analysis exceed the screening values, then the DNR should be contacted for additional guidance. A Level-2 analysis may be required. The Level-2 analysis can also be conducted with the VISCREEN model. The Level-2 analysis is less conservative but is also more complex to perform. More specific information regarding the source, topography, regional visual range and meteorology is required for the Level-2 analysis. The DNR should be contacted for additional guidance on conducting a Level-2 visibility analysis.

Class I Area Impact Analysis

All PSD projects for facilities that propose to locate within 100 kilometers of a Class I area must conduct a Class I area impact analysis. In addition, PSD projects for facilities proposing to locate at a distance greater than 100 kilometers that are large enough that they may have an impact on a Class I area, must conduct a Class I area impact analysis. There are currently no Class I areas located within the state of Iowa or within 100 kilometers of Iowa's borders. During review of the submitted modeling protocol, the department will determine if the PSD project is large enough to require a Class I area impact analysis.

The closest Class I areas to Iowa (depending on the location of the proposed PSD project) are the Boundary Waters National Wilderness Area and Voyageurs National Park in Minnesota, Badlands National Wilderness Area in North Dakota, and Hercules-Glades and Mingo National Wilderness Areas in Missouri.

Modeling Data Submittal Requirements

Site plan (Construction Permit Form MI-1)
The site plan is a vital part of the modeling analysis submittal. The site plan MUST contain ALL of the following:

- A North arrow oriented with true north, not plant north.
- A graphical scale (a printed bar on the map with tick marks indicating the true scale of the plot plan). A simple statement of "1 inch equals 10 feet" is not adequate by itself. The reason for this is that, when the map is enlarged or

reduced, the true scale is no longer evident. When a graphical scale bar is printed on the map, it is resized along with the map if reduced in size for shipping, etc.

- All solid structures (buildings) on the facility property and the surrounding area (if they could influence plume downwash at the facility in question) must be shown along with the peak height of each building and/or tier. Eave heights may be included in addition to the peak heights, but are generally not required. Lattice-type structures, such as substations, should not be included on the site plan.
- All emission points should be shown on the plot plan and must be labeled, including internal emissions and fugitive emissions (storage piles, unpaved roads, etc., if any).
- Both the property line and the fenceline, and any other boundary that would preclude the public access, must be shown on the map. If necessary, a separate, smaller scale map may be included with the submittal to show the full extent of the boundaries.

The site plan may be submitted in either hard copy or electronic format. If submitted electronically it must be in AutoCAD's *.dwg or *.dxf formats. Alternatively, the site plan may be converted into a PDF file (Adobe Acrobat) or any type of image file (*.bmp, *.jpg, *.tif, etc.). Site plans that are submitted electronically allow the modeling group to import them directly into the modeling software, which tends to simplify the review process.

Emission Rates and Source Parameters

All applicable emission rates and source parameters must be summarized in the modeling report. This includes the following:

- Potential hourly emission rates for all applicable pollutants
- Actual hourly emission rates (only necessary if actual emissions are used)
- Stack height
- Diameter (or dimensions if rectangular)
- Flow rate (specify acfm or scfm)
- Temperature
- Exhaust type (vertical, obstructed, horizontal, etc.)
- Any applicable operating restrictions

The summary must include all sources that were included in the modeling analysis, not just those that are a part of the project. The summary must contain enough detail so that the modeling group can easily verify every emission rate and source parameter used in the analysis. The modeling report must also indicate the reference(s) from which the emission rates and source parameters were obtained (i.e. permit numbers, etc.).

File Format

Electronic modeling files must be submitted. Hard copies of the input and output files should not be submitted. All model input and output files are required, including the

BPIP input and output files. If AERMOD is used, all AERMET input and output files for all stages of the processor should be submitted as applicable.

Several third-party software products are available for the model(s) and each uses its own formats and file types. Some of these software packages utilize "input files" for the software itself. These software input files are not the model input files and are not adequate by themselves. Some common file extensions for the model input files are: *.dat (BREEZE), *.dta (BEEST) and *.inp.

Media

The electronic files may be submitted on either CD-ROM or DVD. The files may also be emailed to the modeler assigned to the project if known. However, attachments must be limited to 10 Mb, and may not contain an ".exe" or ".zip" file extension. Contact the modeling group for additional information regarding email attachments and alternative methods for submitting data.